Active ageing communities

ACTIVE AGEING COMMUNITIES (AAC)

PROGRAMME - EVALUATION REPORT

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1. Background

Ageing demographics

The newest WHO projections estimate that the number of individuals aged 65+ years old will increase from 703 million to 1,5 billion worldwide (WHO 2022). Similarly, the European population will grow older with an expected increase from 90,5 million (2019) to nearly 130 million by 2050. Importantly, the European ageing trend will be mostly driven by the oldest old (75+ years-old), while the "younger" older adults (65-74 years-old) will only have a modest increase of 16,6% by 2050. On the contrary, the 85+ year old age-group will be the fastest growing in Europe with an expected growth of nearly 114% by 2050 (EUROSTAT 2020).

Despite this being an outstanding achievement, increased life expectancy is not always associated with extra years in good health. The Healthy Life Years (HLY) indicator developed by the European Union a few years ago describes the number of years that a person is expected to live without disability. The HLY also called "disability-free life expectancy" bypasses the traditional life expectancy indicator. This indicator was developed with several goals including:

i) surveilling the health status of the European citizens;
ii) introducing the concept of quality of life;
iii) evaluating the impact of health policies;
iv) measuring the potential employability of older citizens.

Recent European data on the HLY indicator demonstrates that, the number of years that a citizen may expect to live without functional limitations has slightly increased in the past decade but relatively large differences between countries and socio-economic groups exist (EUROSTAT 2019). Currently, a 65-year-old European man and woman may expect to spend 9,5 and 10,1 years on average, respectively without any functional limitations. At the same time, they may also experience 7,9 and 10,9 years with some level of functional loss, corresponding to 45 and 52% of their remaining life, again with remarkable differences between countries.

Healthy ageing is defined by the WHO as "the process of developing and maintaining the functional ability that enables wellbeing in older age". Functional ability can be considered as the hallmark of independency which "enables older adults to be and do what they have reason to value" (WHO, 2019).

The projections of the ageing European population and especially the exponential increase in the oldest old combined with the mismatch between life expectancy and disability-free life expectancy is causing concerns and forcing policymakers to develop specific strategies focusing on healthy ageing. One of the principal areas of concern for policymakers is the cost of providing adequate health and long-term care, as very old people use proportionally more social and health services compared to other age groups.

Physical activity has been universally considered as one of the most powerful non-pharmaceutical treatments able to counteract the accelerated physiological ageing processes and maintain functional independency. The overwhelming evidence of the health enhancing benefits of regular exercise and in general physical activity for older adults has been translated in national guidelines worldwide, in uncountable

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scientific articles and popular reports with a broad outreach. Importantly, getting active is not just about adding years to life, but it is about adding life to our years. Physical activity has been associated with better quality of life, reduced depression, better self-reported health and self-efficacy, and overall compression of disability (Bangsbo et al, 2019), all outcomes which may significantly contribute to a meaningful life as we age.

Despite the evidence of the potential health and social benefits which may derive from regular physical activity, older adults remain the most inactive age-group of our population, and relatively few meet the national recommendations for physical activity (European Commission, 2022).

To tackle such an unprecedented global challenge a multidisciplinary approach with all relevant stakeholders able to support healthy ageing and independent living in the ageing population is imperative.

The fitness sector has the potential to play a central role in this context and should strive to become a relevant game changer acting jointly with other public and private stakeholders.

The Market penetration for the European fitness sector targeting older adults is currently low and recent data shows that it is below 10% (Deloitte and EuropeActive, 2021). This indeed represents not only an attractive business opportunity, but also a remarkable opportunity to contribute to this societal challenge along with other more “traditional” stakeholders such as health and service care providers.

There are several relatively well-known barriers for initiation and maintenance of physical activity programmes including a lack of knowledge of the health-enhancing effects of physical activity (Gibney & Doyle, 2017), social isolation and loneliness, perception of poor health and difficulties in coping with reduced mental and physical capacity (Biedenweg et al., 2014; Bangsbo et al., 2019). On the contrary, several facilitators are relatively well-known and include meaningfulness of a physical activity program, an environment which is physically and socially supportive including peer support and social networking (Bangsbo et al., 2019), enjoyment, positive outcomes expectations, influential role of the instructor, facilities nearby and easy access to transportation.

Considering the barriers and facilitators identified above, the traditional way to design exercise programmes and in general physical activity interventions should be reconsidered, taking these elements into account. More tailored and complex interventions incorporating some of the key components mentioned above may be not only desirable but needed, especially when aiming to attract less motivated, unexperienced target groups where health may not be the main goal.

The **Active Ageing Communities (AAC) Project** was designed as an innovative complex intervention incorporating several complimentary elements to facilitate the adoption and maintenance of an active lifestyle for older adults. The project was tailored as a community-based programme embedded in the fitness clubs in six European countries and delivered by fitness instructors employed in the clubs.

Aims

The aims of the AAC programme were thereby to:

i) create a community for healthier and more active older adults by improving overall health, physiological capacity (e.g. muscle strength) and physical function (e.g. walking ability) and reducing the number of participants with elevated risk of future disability;

ii) reduce social isolation and exclusion by creating an interactive community of older adults which would facilitate the adoption of new health behavior(s) and would be sustainable after the completion of the AAC program;

iii) optimise retention in exercise programmes by reducing the number of participants dropping out of the programme;

iv) have new members enrolled in the fitness clubs by recruiting a relatively high proportion of older adults who were currently not enrolled or never been enrolled in fitness clubs.

2. Methods

2.1 DESIGN

The programme was designed as a 24-week complex intervention and structured with four different modules carried out in the fitness centres and within the community (Figure 1):

Module 1: Educational awareness

The specific goals of this module were to:

- provide a basic knowledge of the biological ageing process, role of nutrition and lifestyle behaviours (physical activity and sedentary behaviour);
- increase the awareness to which extent, specific life-style habits and behaviours (e.g., reduced sedentary time, increased daily physical activity) may potentially modify ageing trajectories.

The long-term goal of this module was to use such knowledge to support a new life-style habit.

This module was designed with three structured presentations dedicated to the participants, their families and friends and it was delivered by the fitness staff. The three themes were:

1) Biological processes of ageing. What happens to our body when we get older?
2) Physical activity, exercise, and sedentary behaviour.
3) Nutrition and foods in ageing.

Key information for each theme was provided in a simplistic way with multiple examples and frequent questions asked to the participants.

The format of the presentations was not designed as *"traditional lecturing"* and passive listening, but rather focused on a dynamic interaction with the audience and focused on creating a familiar and friendly environment to support social interaction in the group. A particular attention was dedicated to preventing the participants from feeling judged in an environment which often focuses on stereotypes.

The SDU team in collaboration with other experts created the presentations in English and a manual for the fitness instructors with a detailed explanation of each slide. The presentations were translated in the different languages by the National Fitness Associations or by the Fitness clubs. Minor adaptations were allowed to accommodate the different groups of participants where needed.

Module 2: Social inclusion and connectiveness

Sense of belonging and reduced feelings of loneliness among older adults have been shown to have a positive impact on quality of life and health outcomes in older adults. The main goals of this module were to:

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- increase social inclusion and "connectiveness" among the participants;
- stimulate family support and long-term adoption of new life-style behaviour.

The module was thereby designed with two main components:

1) Peer-led social activities;
2) Intergenerational events.

Participants were invited to suggest and "lead" social activities and events which were meaningful to them and would strengthen motivation and adherence to the programme. The role of the fitness instructors was to facilitate the peer-led activities without interfering with the choices of the groups. However, some general suggestions were provided by the SDU team (e.g. provide a physical space for coffee break to be used before or after the exercise class), although each fitness club was encouraged to design this component. The intergenerational activities were led by the fitness instructors and designed locally by each fitness club, similar to the peer-led activities. A set of suggested activities from each country were presented and discussed during the AAC consortium meeting(s) and used to disseminate to the national fitness clubs.

Module 3: Exercise

The health benefits of exercise are well established. The exercise module of the AAC programme built on WHO's newly updated physical activity guidelines for older adults and the most up to date scientific evidence (WHO 2020). The programme was designed with biweekly frequency (2 non-consecutive days), 1 hour per session, for 24 weeks in total. The exercise programme was divided into three blocks. The first block of the intervention was used as familiarisation, where learning exercise techniques and understanding of training intensity are included. The second block had the main goal to increase physiological capacity in terms of maximal muscle strength and aerobic capacity. The third and final block focused on increasing muscle power, aerobic capacity, functional training focusing on functional performance (e.g. walking, balance, reaching out) and motor skills (e.g. complex reaction time).

Module 4: Behavioural change

This module aimed to enhance the potential effects of the modules 1-3 by establishing healthy habits beyond the "physical borders" of the fitness facility and extending the AAC programme into the community environment. The main aim of this module was to increase motivation to promote and maintain physical activity beyond the structured exercise programme and optimise retention to the programme. The module was designed as 10 Instructor-led behaviour change meetings carried out in parallel with the 24-weeks AAC exercise programme. The meetings included discussions to identify barriers and facilitators to increase and maintain physical activity and to share "successful solutions" among the participants. The behavioural change meetings used motivational interviewing and other methodologies based on behaviour change techniques such as goal setting, self-monitoring, and habits formation to support behaviour change. The behavioural change programme was inspired based on evidence from the SITLESS project funded

under the EU Horizon 2020 programme and the WIPP project funded under the EU Interreg 5a program (Gine Garriga et al 2017, Olsen et al 2022).

The role of the fitness instructors during the behavioural change "sessions" was to facilitate the process of discussion and exchange ideas and solutions and support self-empowerment and self-management.

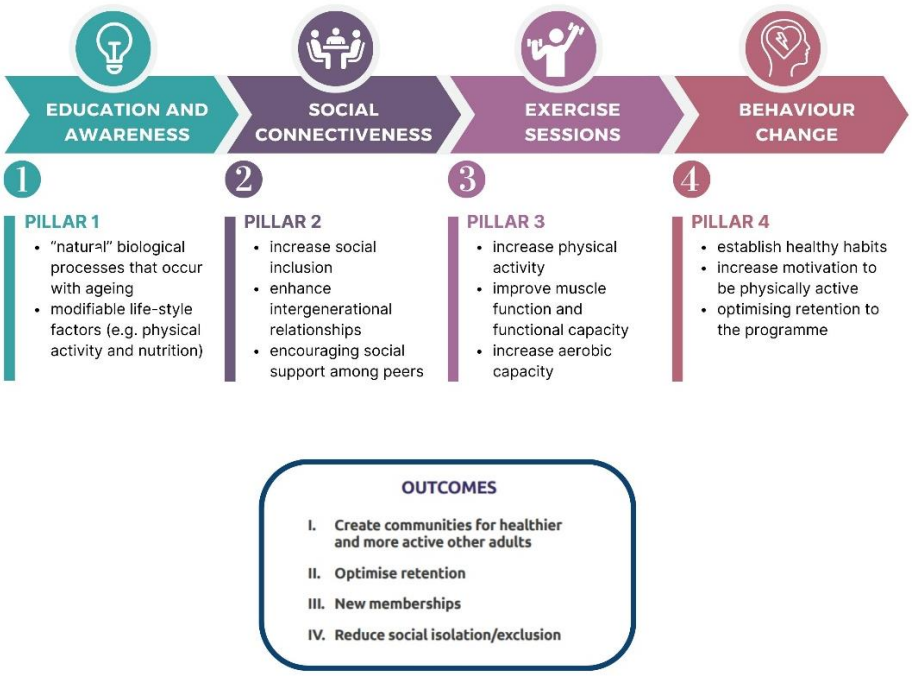

Figure 1: *AAC Framework.*

2.2 IMPLEMENTATION

The AAC programme was implemented in six European countries: Portugal, Ireland, Greece, Czech Republic, Finland, and Italy. Each country recruited three fitness centres from urban and rural areas with the goals of providing different set-ups and profile of the citizens enrolled and maximizing a broad implementation after the conclusion of the project.

2.3 EVALUATION MEASURES

Age, sex, civil status, living arrangement, chronic conditions and height were collected by the fitness clubs at baseline to provide basic characteristics and a profile of the participants.

The effectiveness of the AAC programme was evaluated by a set of domains assessed before and after the intervention. The evaluation included measures of *anthropometrics* (e.g. weight, body composition), *physical function, physical activity and sedentary behaviour, loneliness, social network and quality of life (see below).*

Physical function and one-leg balance

Physical function was measured with the Short Physical Performance Battery (SPPB) and 30-seconds one-leg balance test (Figure 2). The SPPB characterizes lower extremity function using timed measures of standing balance (side-by-side stand, tandem and semi-tandem positions), self-selected gait speed (timed 3m walk), and lower extremity power with a timed test of five chair rises as fast as possible (Guralnik et al. 2000). The three tests are rated with a score of 0-4 and are added together to form the 12-point summary scale, a higher score indicates better physical function. The SPPB is highly predictive of subsequent mobility-related disability, institutionalization, and mortality (Guralnik et al. 2000; Guralnik et al, 1994; Studenski et al. 2003). A score below 9 has been earlier considered as elevated risk of disability. Changes in the number of participants with the score < 9 was also assessed as indicator of reduced risk of future disability.

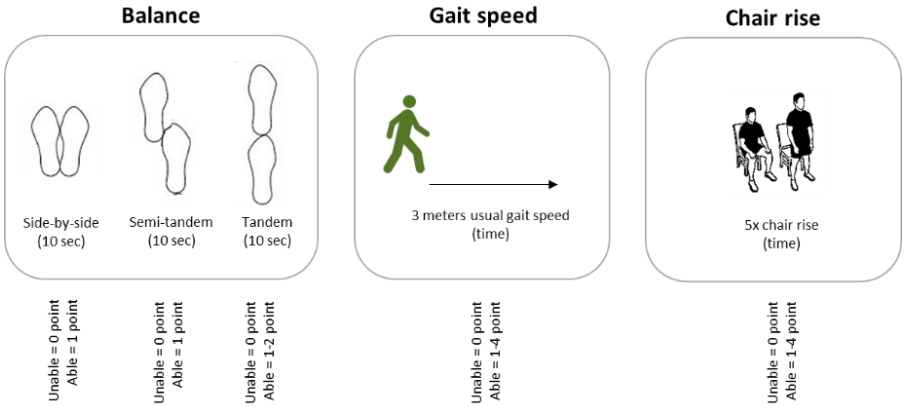

Figure 2: *Description of the Short Physical Performance Battery test (SPPB).*

One-leg balance is a measure of static standing ability. Individuals were asked to stand on one leg, as long as possible with a maximum time of 30 seconds. Participants were asked to perform the test with their right and left leg with 30-second rest between the tests. The participants were asked to fix vision at one point of the wall and were allowed to hold the foot of the free leg anywhere without holding onto the standing leg. Arms were kept at each side of the hip. The test was stopped when the free leg touched the ground and the total time on each leg was reported.

Physical activity

Physical activity was measured by the International Physical Activity Questionnaire (IPAQ) (Craig et al 2003). The questionnaire consists of 7 questions asking the participant to recall the previous week of physical activity and sedentary behaviour. The IPAQ asks about the number of days and the time the participant spends walking, sitting, being moderately active (e.g., carrying light loads, bicycling at a regular pace, or doubles tennis) and vigorously active (heavy lifting, digging, aerobics, or fast bicycling. Data are reported in METs minutes/week and sitting hours.

Loneliness and social network

Loneliness was measured with the UCLA 3-Item Loneliness Scale (Hughes et al. 2004). The scale consists of three questions that measures three dimensions of loneliness: relational connectedness, social connectedness, and self-perceived isolation. Each question has three levels, *hardly ever / some of the time / often* which are coded as 1, 2 or 3 points. The summed score provides a total score ranging from 3 to 9, with a higher score indicating more loneliness.

Social network was measured with Lubben Social Network Scale (LSNS) (Lubben et al. 2006). The LSNS is a validated questionnaire designed to describe social isolation in older adults by measuring the number and frequency of social contacts with friends and family members and the perceived social support received from these sources. The answers are scored: none = 0, one = 1, two = 2, three or four = 3, five thru eight = 4, nine or more = 5. The LSNS total score is a sum of the six items. Each LSNS question is scored from 0 to 5 and the total score ranges from 0 to 30. A score of 12 and lower delineates "at-risk" for social isolation.

Quality of life

Quality of life was measured with the Euro-Qol-5D-5L questionnaire (Janssen et al. 2013). The questionnaire asks for current health-related quality of life, covering five dimensions: Mobility, Self-Care, Usual Activities, Pain/Discomfort, and Anxiety/Depression. Each dimension has five different answers: *i) no problems, ii) slight problems, iii) moderate problems, iv) severe problems, and v) unable to/extreme problems*. The answers for the five dimensions are combined into a 5-digit number that describes the participant's health. The Euro-Qol-5D questionnaire also includes a visual analogue scale on which the participants are asked to rate their own health between 0 (worst imaginable health state) and 100 (best imaginable health state) (Janssen et al. 2013).

2.4 PROCESS EVALUATION

The process evaluation was based on quantitative and qualitative data provided by the different AAC stakeholders with the aim to explore the implementation and understand the effect of the complex AAC program. The quantitative data included retention to the program which was one of the primary goals for the AAC project. The qualitative data included a combination of short questionnaires and semi-structured face-to-face interviews. Each intervention site was asked to interview at least 2 older adults, 1 fitness instructor and 1 club owner. Furthermore, all National Fitness Associations (NFA) were interviewed by the research group. The semi-structured interviews were designed around four key themes:

- **Recruitment:** *the recruitment theme* focused on i) the pathway(s) and strategies used to recruit the older participants by the clubs and ii) whether the profile of the AAC participants was different from the "traditional" old fitness club members.

- **Implementation:** *the implementation theme* aimed at understanding i) how the different modules of the AAC program (module 1-4) were implemented, ii) whether any deviation according to the intervention manual was carried out, and iii) potential reasons and type of changes implemented.

- **Context:** *the context theme* focused on the contextual factors regarding the characteristics of the country, culture, club, the neighborhood and how this may have affected the implementation of the program and the outcomes assessed.

- **Perceived effects:** *the perceived effects theme* aimed at identifying the effects that the AAC participants perceived which they considered a direct effect of the AAC programme.

The qualitative analysis process had 5 steps (Coll-Planas et al. 2019):

1) transcription and translation (where needed);
2) coding (performed by two researchers;
3) indexing and grouping;
4) analysis and interpretation;
5) theme development (agreed by consensus).

Finally, a short self-reported questionnaire was administered to all to evaluate recruitment pathways and to rate the AAC program and the four containing pillars. The participants were asked to rate the different components of the programme on a scale from 1-5 (1 been worst score and 5 been the best score). Moreover, all involved fitness instructors were asked to fill out a short questionnaire with the main aim to get an overview of all the different profiles of fitness instructors delivering the AAC programme.

2.5 DATA ANALYSIS

Baseline data are reported as frequency and average. The effect of the intervention was evaluated by t-test with the exact P-value reported in the table.

3. Results

Five hundred and fifty-five older adults from six European countries were recruited by the 18 fitness clubs (Figure 3). Covid-19 had a significant impact on the implementation of the AAC programme in some countries which ultimately were forced to postpone the start of new teams due to national Covid-19 restrictions. At the end of the project in December 2022, over 150 participants are still taking part in the AAC programme in different countries.

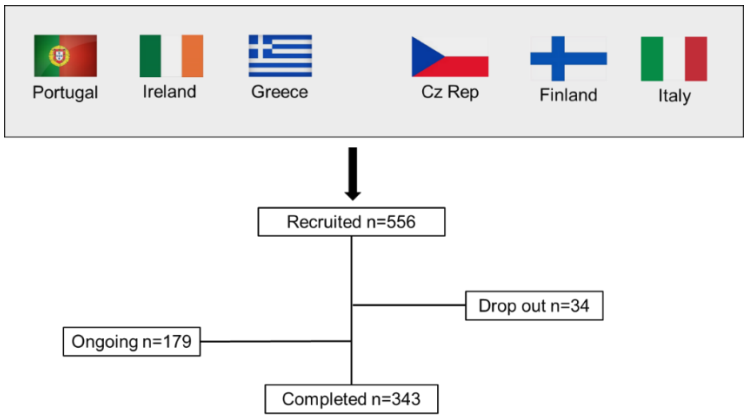

Figure 3: *Flowchart of the participants enrolled in the AAC programme.*

3.1 BASELINE CHARACTERISTICS

The AAC participants had an average age of 71,1 years and nearly 75% of the subjects were female (Table 1). Most participants were married or had a partner (86%) and, on average 21% lived alone, although with a large difference among the 6 European countries (e.g. 58% Finland, and 13% Greece). Physical function, assessed by the SPPB test showed that on average participants had moderate to good function, with a 9,6 mean European score, which was similar between men and women (Table 1). Regardless, some countries (Portugal and Greece) had a mean SPPB score below 9, which has been noted to be a cut-off point for elevated risk of functional impairment. This may indicate that these two countries used a specific recruitment pathway targeting participants with mobility-disability. On average, 26% of all European participants had reduced mobility (SPPB score < 9), again with a substantial difference among the European countries. Finland had the lowest prevalence of participants with mobility issues (4,4%) while Czech Republic and Greece had the largest number of participants with mobility challenges (38,8% and 36,4%, respectively). Similarly, participants from the Czech Republic, Portugal and Greece had on average the lowest gait speed (0,75, 0,83 and 0,93 m/s, respectively) which is generally considered below a threshold of greater risk of mobility-disability (≤0.9m/s). Physical activity and sitting time assessed by the IPAQ questionnaire showed that on average participants had 2814 METS min/week and reported 5,1 hours sitting time per day (Table 1). A substantial difference was observed across the 6 countries with the Finnish participants reporting the lowest time spent sitting and the highest weekly energy expenditure.

Overall, the baseline results indicate that despite the substantial difference in age, sex, civil status and living conditions, physical function, and life-style behaviour

among the six countries, the national clubs were able to recruit participants with a broad spectrum of mobility and behaviour.

Table 1- Baseline Data

Number of participants = 556	All	Female	Male
Sex (%)	/	73,3	26,8
Age (years)	71,1	70,6	72,5
Chronic conditions (number)	1,16	1,53	1,90
Civil status			
Single (%)	11	10,7	11,8
Married / law-partner (%)	85,4	87,1	80,3
Widow / Widower (%)	3,0	1,3	7,9
Divorced (%)	0,7	0,9	0
Living			
Alone (%)	20,9	23,6	13,2
Wife / Husband / Partner (%)	64,5	63,1	68,4
Son / Daughter (%)	11,0	10,2	13,2
Other relatives (%)	3,3	3,1	3,9
Other people (no relatives) (%)	0,3	0	1,3
Weight (kg)	72,5	69,2	81,4
Height (cm)	166,2	163,4	173,4
BMI (kg/m2)	26,2	26,0	27,0
Physical function (score)	9,61	9,67	9,42
Gait speed	0,99	0,98	1,07
Reduced mobility (SPPB < 9) (%)	26,1	25,9	26,8
Chair-rise (seconds)	14,0	14,3	13,0
Balance left (seconds)	14,9	16,4	9,3

3.2 EFFECTS OF THE AAC INTERVENTION

Effects of the AAC complex intervention programme on health function and behaviour

The AAC complex intervention programme induced positive and significant changes on anthropometric, physical function, behaviour, social relationship, and loneliness domains whereas no changes were reported for self-reported health status (Table 2). On average, participants reduced their body weight (0,7 kg) and fat percentage (subsample of countries using Bioimpedance methods) and increased their fat free mass, which translated into lower BMI.

Importantly, participants improved on average statistically, and clinically significant improvements were observed for the physical function measurements with a net increase in the SPPB score of 0,67 points from 9,49 at baseline to 10,16 after the intervention. This is a remarkable change as an increase in 0,5 points in the SPPB score has been previously reported to be clinically meaningful. Also, the number of participants with reduced mobility (SPPB score < 9) decreased from 26,1% of the total AAC population before the intervention to 21,1 % after the intervention. Similarly, gait speed increased from 0,95 m/s at baseline to 1,06 m/s after the intervention with an average increase of 0,11 m/s. Importantly, an increase in 0,05 and 0,1 m/s in self-selected gait speed has been previously reported to be subclinical and clinical meaningful, respectively. Two other key indicators of neuromuscular performance, five-timed repeated chair-rise, which represent both muscle power (force x velocity) and motor control, and the single leg balance tests showed a significant and clinically relevant improvement after the intervention. In general, the anthropometrical and functional outcome measurements indicate that the AAC programme was not only effective in determining a significant difference but also had a clinical impact and relevance.

The behavioural domains (daily physical activity and sitting time) showed that the AAC participants improved their physical activity/daily energy expenditure from 2519 to 2912 METSmin/week and reduced their sitting time by 30 minutes per day (Table 2) . Finally, participants reported to have reduced their level of loneliness, increased their social relationship and overall health related quality of life. Overall, these results indicate that the AAC complex intervention programme was able to produce positive changes across a variety of domains (e.g. health, physical function, life-style behaviour, loneliness and social relationships) which have been consistently associated with negative health outcomes (Table 2).

Table 2 – Pre-Post data – total sample

	Pre mean	Post mean	Significant different Yes/no	p-value
Weight (kg)	74,0	73,3	Yes	<0,001
BMI (kg/m^2)	26,7	26,5	Yes	<0,001
Fat percent (%)	31,5	30,6	Yes	0,003
Fat-Free-Mass (%)	68,5	69,4	Yes	0,003
Physical function (score)	9,49	10,16	Yes	<0,001
Gait speed (m/s)	0,95	1,06	Yes	<0,001
Reduced mobility (SPPB<9) (participants, %)	26,1	21,1	Yes	<0,001
Chair-rise (seconds)	14,3	12,1	Yes	<0,001
Balance left (seconds)	15,3	17,9	Yes	<0,001
Balance right (seconds)	17,7	20,2	Yes	<0,001
IPAQ$_{total}$ (METS$_{min}$/week)	2519	2912	Yes	<0,001
IPAQ$_{sitting}$ (hours)	4,34	4,06	Yes	0,002
Loneliness (score)	4,81	3,62	Yes	<0,001
Social relationship (score)	17,3	18,1	Yes	<0,001
Health related QoL(score)	75,5	81,4	Yes	<0,001
Health status (score)	0,76	0,77	No	0,168

3.3 PROCESS EVALUATION

3.3.1 RETENTION TO THE AAC PROGRAMME

The health benefits of physical activity and exercise are well established and includes lower risk of cardiovascular disease, hypertension, cancer, type 2 diabetes. Furthermore, exercise can prevent falls and improve bone health, physical and mental health as well as quality of life in older adults. Although beneficial effects of physical activity are shown, the effectiveness is influenced by the number of participants completing the physical activity programmes. The common percentage of "drop-outs" for similar interventions, as AAC, is close to 50%. The AAC programme had an ambitious target of 75% of older adults completing the 24 weeks long AAC programme. Figure 3 shows a flowchart of the participants from each country that have started and completed the programme. The project has successfully fulfilled one of the main outcomes of the project with 377 older adults starting the intervention and 344 completing the intervention, which generate a retention rate of 91%. One reason for the high retention might be the design of the AAC programme which composed of four different components (see methods section) with each a specific purpose and the overall aim to create the sense of belonging into an Active Ageing Community, that have been demonstrated as an important factor in achieving a high rate of retention. As an example, the AAC programme had a major focus on the social component to increase social inclusion and connectiveness among the participants. In general, social interaction and enjoyment are important for promoting adherence and encouraging the participants to maintain their healthy behaviour. The evaluation of the projects shows that the AAC programme was able to increase social relationships and decrease loneliness (see table 2).

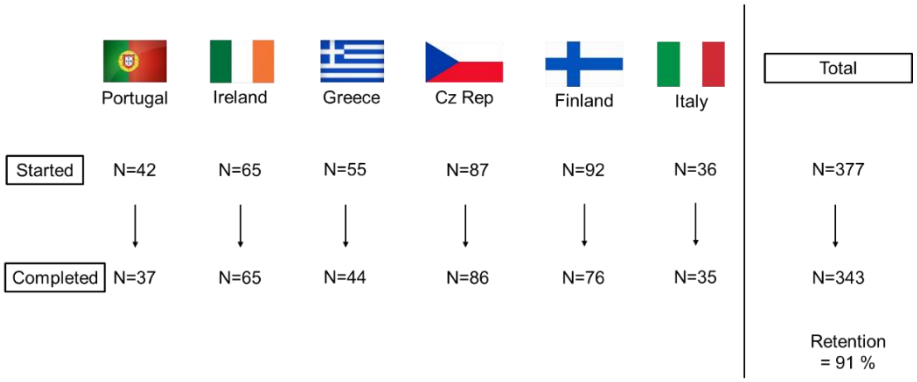

Figure 4: *Number of participants finalizing the AAC programme (retention).*

3.3.2 RESULTS FROM THE SEMI-STRUCTURED INTERVIEWS

Semi-structured interviews were conducted with older adults (n=17), fitness instructors (n=9), national fitness associations (n=6) and club owners (n=7) to explore their experiences of the active ageing programme. While the semi-structured interviews were not included in the original project proposal within the AAC application to the EU commission, they have added value in understanding on the potential mechanisms which may have influenced the results. The interviews

required a substantial amount of work and were carried out using additional external funding provided by the University of Southern Denmark (SDU), Centre for Active and Healthy Ageing, EuropeActive and Ulster University.

The Participation representation at each of the involved sites is included in table 3.

Country	Czech Republic	Finland	Ireland	Italy	Greece	Portugal
Participants (n=)	3	5	13	5	9	4

Table 3: *Participants representation by country.*

Older Adults Results

Data analysis of the transcripts from the interviews with the older adult participants regarding their perceptions of the intervention identified three main themes across each of the four modules, as depicted below:

Educational Awareness Module:

- Increased their understanding of the health benefits of physical activity;
- improved awareness of the importance of being active;
- promoted the uptake of healthy habits.

The results from the older adult interviews revealed various motivational factors which favored participation to the program. Analysis of the interviews demonstrated that the educational module increased awareness of the benefits of being physically active and increased their understanding of the modifiable risk factors (provided with advice on nutrition and type of exercise). The findings suggested that the educational module supports positive behavioural changes in everyday living habits and helped increase daily physical activity levels among the older adults.

After the education meetings, older adults reported that they felt more informed about the benefits of leading a more active lifestyle that as a result, they incorporated healthier behaviours into their routine. Some participants revealed that the program made them appreciate the importance of investing time in their own health.

“I got inspired… I need to do more for my health. I need to change my lifestyle in order to feel better” (Female, OA)

“I wouldn’t miss them. I learnt many new things from the experts. Hearing new ideas, new nutrition tips, also they gave me solutions for my back that hurts a lot, so I felt better” (Female, OA)

Social Inclusion and Connectiveness Module:

- Positive impact on relationships;
- enhanced their social network;
- improved familiar relationships (strengthened family bonds).

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Regarding the social inclusion and connectiveness module, being part of a group-based programme offered the participants the possibility to meet and interact with other members, boosting their sense of belonging and increased cohesion and collegiality among peers. Most of the older adults reported that, the group-based element supported the development of new friendships, increasing their social network by meeting new people from the same community.

The findings have demonstrated that the cohesion created within the group resulted in increased enjoyability of the programme and encouraged the newly created relationships to continue after the programme ended. Most importantly the participants reported a strong sense of support from peers while exercising, highlighting the benefits of exercising with their peers.

Another important finding was surrounding the importance of support received from their family members (children, grandchildren, spouses) who encouraged them to participate in the programme. They stated that this boosted their motivation along the way by them showing interest in their commitment and highlighting that they noticed improvements ("you look 10 years younger", "your belly is gone"). This seemed to heavily influence participation, with the self-perceived benefits of aspects including; reducing back pain, feeling more energic, feeling stronger and in better shape having lost some weight and refining their waistline that together with the improvements noticed by family members and friends resulted having an impact on adherence to the programme.

"I attended all the sessions, the benefits for me were the company that was created" (Female, OA)

"I realised that I wasn't alone; all the people in the program had the same problems as me. That gave me courage and strength." (Female, OA)

"I met people of the same age, with the same experiences and we shared our fears, our thoughts and our everyday worries. It was very helpful, and I found people in this programme who were willing to listen to my problems and find solutions without judgments. I found support and my everyday life became easier." (Female, OA)

Exercise Module:

- Enjoyed the variety of exercises included and perceived benefits of group-based exercise and working with peers;
- appreciated having a trainer and a tailored programme;
- noticed improvements in their physical and functional health and increased self-confidence.

The analysis of the semi-structured interviews revealed that the exercise modules' structure had many points of strength. All the participants expressed their satisfaction with the fitness instructors, which whom a sense of attachment was created thanks to their care and attention towards their needs. In addition, having a tailored programme for older adults was positively received, with participants reporting that they were comfortable exercising in a programme specifically designed for persons aged over 65 years.

The analysis demonstrated that the supervised sessions allowed participants to feel safe and increased enthusiasm supporting them to be fully committed with the programme until its end, avoiding missing any sessions at all costs. All the

participants agreed on the importance of the fitness instructors which have been seen as fundamental figures. Their professional approach was perceived as an added value which improved motivation to participate in the program. Furthermore, along the way they noticed an increased familiarity with exercising, being able to increase the degree of difficulty of the performed exercise which contributed to boosting their self-confidence. This has been gradually achieved, without overstepping their limits, as it was reported from one of the participants that they appreciated not feeling under pressure, as the fitness trainer didn't force the pace, instead recommended adjusting the exercises according to their preference. Moreover, all the interviewed participants reported many perceived benefits on the physical level (increased muscle mass, decreased waistline, reduced backpain) which supported adherence by increasing motivation to complete the programme.

"Exercise sessions are my favourites. We start with warmup, sometimes we play games, sometimes memory games when exercising… We listen to our favourites songs, you would not understand nor know the songs, it is too old… as we are…" (Female, OA)

"Now it is a part of my daily routine. It's necessary for me to be able to exercise and of course I started to like it more. When the programme was concluded I missed it a lot. I try to follow everything we did during the programme." (Female, OA)

Behaviour Change Module:

- Developed healthier behaviours and made positive lifestyle changes;
- promoted maintenance of positive lifestyle changes;
- increased daily physical activity.

All the participants reported positively on the group-based element of the programme, stating that they felt supported and pleased to share the experience with people having similar personal and physical conditions and not necessarily much experience with exercising. All of that was facilitated by moments of social connection outside the gym (coffee breaks or planned social activities) useful to consolidate friendships within the group, providing the opportunity to discuss and comment on the programme or simply enjoy a chat with a new friend.

Participants reported that the behaviour change sessions were an important component of the programme, allowing them to set goals and focus on their health in a supportive and safe environment. They described the sessions as being motivational as it gave them something to work towards and reflected positively on the sense of achievement gained when they achieved their goals.

"I was informed about many new things and they have changed my priorities. I am trying to adopt what I learnt in my daily life." (Male, OA)

"After a long time I got motivated and set goals again. I achieved most of them. Overall the benefit was that I got off the couch again." (Male, OA)

"I focused more on my health and my entertainment. In my age, simple things like a walk or a coffee with a friend can give me a joy and a satisfaction..." (Female, OA)

In summary, the main factors which were deemed most influential in promoting adherence and retention to the programme are included under each module as below (Figure 5):

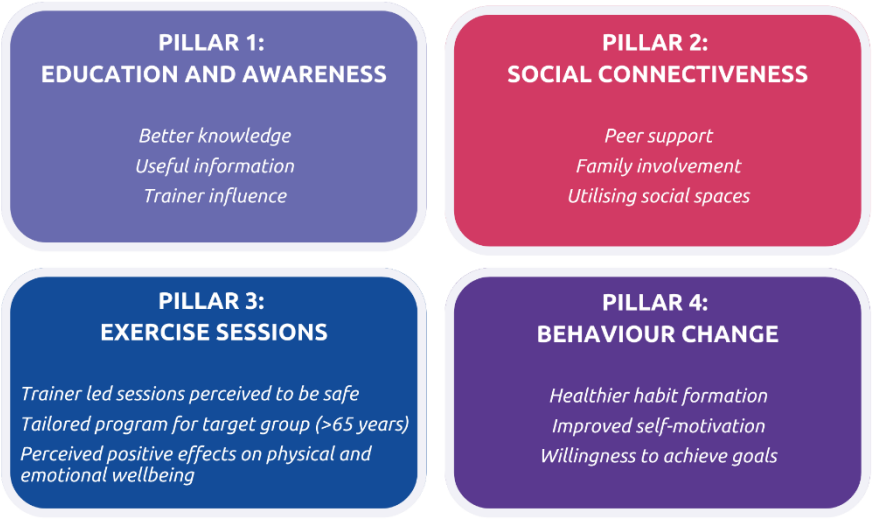

Figure 5: *Main factors in promoting adherence to the Programme.*

Fitness Instructors Results

Data analysis of the transcripts from the interviews with the fitness instructors regarding their perceptions of the intervention identified three main themes:

- Importance of delivering a tailored and adaptable exercise programme.
- Communication, patience and empathy identified as key contributors to intervention success.
- Recognition of the need for instructors to possess multi-disciplinary skills.

The instructors reflected on the various components of the intervention, stating that the presentations delivered within the educational awareness module increased older adults' interest in their health and wellbeing. They reported that the increased knowledge and understanding of the benefits of exercise was demonstrated in the older adult's enthusiasm to engage with the programme. As a result, the older adults were motivated and encouraged to keep up with their training and support sessions. Regarding the social inclusion and connectiveness module, the fitness instructors reported on the benefits associated with the group engaging in activities outside of the structured sessions. They perceived that the social components promoted attendance at the exercise sessions, as participants got to know each other on a more personal level.

The fitness instructors also echoed that reported by the older adults, stating that they noticed both physical and psychological benefits to participants. They also noted the importance of being creative within their session delivery to maintain interest in the exercise sessions, while delivering an appropriate session that targeted the health and fitness needs of the group. In terms of the behaviour change module, the fitness instructors reported on the benefits of goal setting and noted some positive improvements in lifestyle during the programme.

"The times that we did bring them out for a coffee or a walk, it's almost like you see a whole new side of them. They are getting comfortable with each other by coming out of the environment where they are learning or exercising, it just facilitates seeing people at an all-round. The conversation changes and you see who people really are." (Fitness Instructor, Ireland)

"Older adults increased their daily activity, despite the short duration of the program, the older adults started to change their lifestyle increasing physical activity levels." (Fitness Instructor, Greece)

Club Owners Results

The interviews with the club owners highlighted the benefits and importance of providing programmes such as this within their centres. They also highlighted that it brought a whole new demographic into their centre which they may have not seen, had the intervention not been conducted there.

"I think it's fantastic. Like we normally would not have that age group coming in here, maybe more so in or other gyms but in terms of giving people the knowledge of why they should be doing a bit more activity, not everyone takes that on board." (Fitness Instructor, Ireland)

They recognised the need to support the older adult community and the business opportunity associated with providing such a service. While recognising the economic benefits, they noted that the social benefits for this age group outweighed any financial gains.

"Recognition of the ageing population and relevance and need for programmes like this. Population is growing older so there's potential for a new business opportunity." (Fitness Instructor, Czech Republic)

The club owners reflected on effective recruitment strategies, noting that word of mouth or recommendations from current members or participants attributed to most of the new participants entering the programme. Advertising through social media outlets was also reported as an effective method of recruitment. Some club owners also stated that recruitment through healthcare centres was successful.

An innovative aspect of the AAC project was the intergenerational component, in this regard the club owners have expressed positive feedback, reporting that this element of the programme had a positive impact on participant's involvement, recognising the importance of including families as a means of supporting older adults to engage in physical activity and increase their confidence and motivation to exercise. The club owners reflected positively on the content included within the programme, highlighting the important role that the fitness instructors played in delivering an engaging programme which resulted in such positive outcomes for participants. Some club owners also reported that they would continue to implement aspects of the programme beyond completion of the AAC project, highlighting the benefits they perceived were attained from implementation of the programme.

Reflecting on the main aims of the programme, one of which was surrounding creating a community of active older adults, the club owners reported that they felt this was achieved through the social activities and healthier habits that were attained and demonstrated by participants throughout the programme. In terms of

external factors that could have influenced implementation of the intervention, COVID-19 was noted as a major obstacle which directly impacted various aspects of programme delivery.

National Fitness Associations Results

The qualitative analysis of the interviewed national fitness associations highlighted different factors of interest for future interventions. In terms of recruitment strategies, the suggestions included the use of social media outlets, presenting the programme in locations where older adults may use such as coffee shops and golf clubs and as noted from the other stakeholders the benefits of promoting the programme through word of mouth.

The NFA's all agreed on the importance of specific outcomes of the AAC project which included, increasing social inclusion and connectiveness, creating and promoting awareness of the importance of physical activity and supporting older adults to adopt healthier lifestyles. Among the many advantages of the AAC project, the NFA's commented on the programmes reproducibility and sustainability. They reiterated the importance of the educational module in increasing their awareness of the benefits of being more physically active and improving their knowledge surrounding healthier behaviours. When considering the economic aspect of investing in the AAC project, the NFAs concurred that raising the fitness sector's attention towards an older population has the potential to expand the fitness market and open its sector to new opportunities.

One of the NFA's from a European country with an increasing ageing population noted that the government recognised the importance of investing in programmes like the AAC project to give older adults the opportunity to improve their physical and mental well-being. Trying to reduce social isolation was also a key goal following the impact of restrictions that were imposed as a result of COVID-19, this was also acknowledged by the NFA's. One of the significant drivers within the AAC programme was the inclusion of highly qualified fitness instructors whom guided, motivated and supported the participants throughout the course of the programme. The NFA's appreciated that the trainers required a multi-disciplinary skill set in order to deliver a successful intervention. They alluded to the importance of communication skills and the ability to motivate participants as key attributes of a successful trainer. Furthermore, they reported that it was important that fitness instructors were patient and adaptable, ready to make changes to the structured programme depending on the abilities and limitations of the participants. The NFA's expressed their satisfaction with the AAC project and reported that they intend to keep investing in its implementation given the positive results that have been encountered. They highlighted the benefits gained by participants and also their clubs benefiting from the project with an increase in new memberships.

Summary Findings

The findings from the qualitative analysis demonstrate that the AAC programme improved overall health, physiological capacity and physical function, created a sense of belonging and that participants perceived and experienced physical and psychosocial benefits as a result of participation. The stakeholders reflected positively on the AAC project, highlighting this need for this service among the older adult population.

3.3.3 RECRUITMENT PATWAYS FOR THE AAC PROGRAMME

The Clubs included in the AAC project were responsible for the recruitment of the older adults in collaboration with the National Fitness Associations of the six involved countries. Previous experience of running similar interventions has demonstrated the difficulties in identifying and recruiting inactive elderly people to past projects. To increase the possibility of achieving the predetermined number of participants and to enhance and simplify the recruitment process, only clubs with highly experienced professionals and good social connections were selected. One of the main aims of the AAC project was to involve both already active members of the clubs, but also inactive older adults with the potential of turning them into regular members of the club and thereby increase the possibility of maintaining healthier behaviours.

Figure 4 shows the different recruitment pathways of the AAC project and indicates that over 65% of the participants were recruited outside of the fitness club. The involved clubs in the AAC project have succeeded to recruit older adults from outside the fitness environment and different pathways have been applied. Additionally, more than 55% of the participants have entered a fitness club for the first time or re-visited the fitness club after a physical inactive period (figure 6).

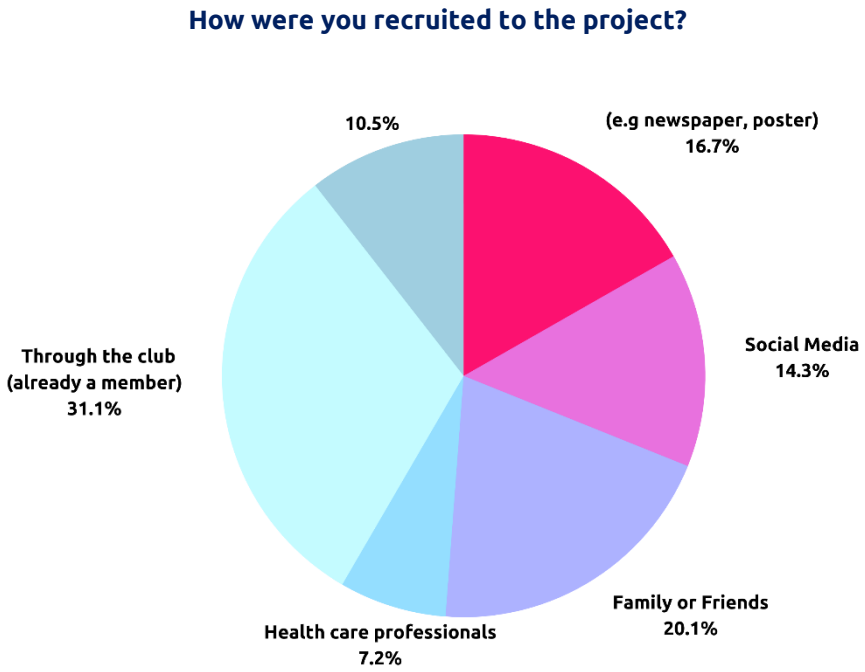

Figure 6a: *Methods of recruitment.*

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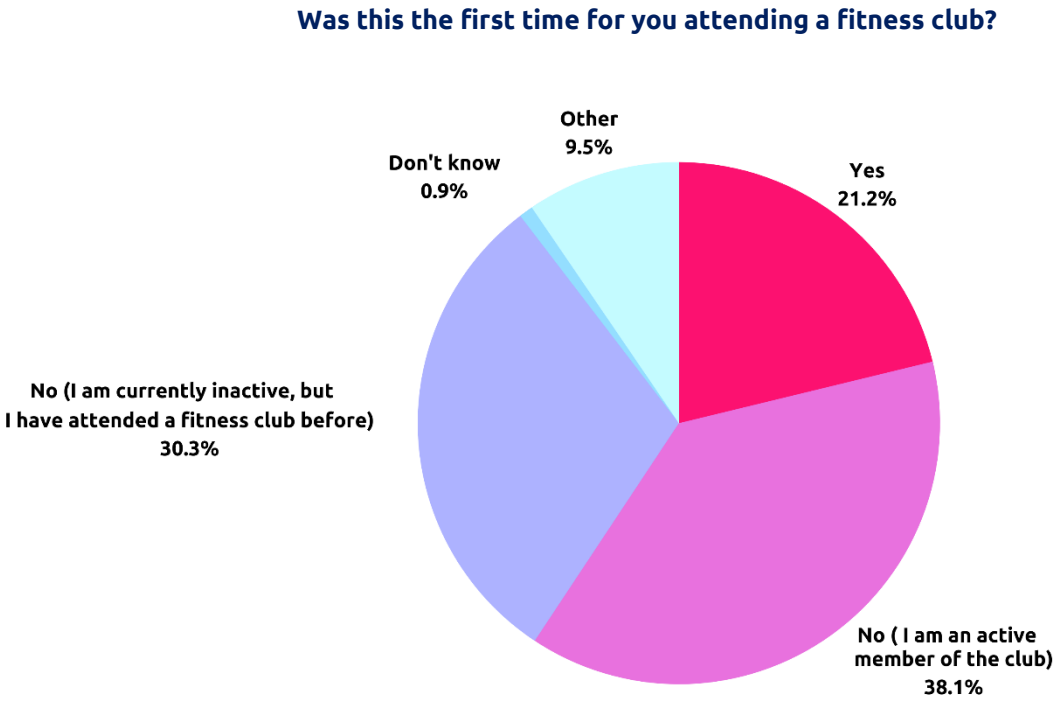

Figure 6b: *Recruitment pathways and new memberships.*

3.3.4 PARTICIPANTS RATING OF THE AAC PROGRAMME

All participants responded to a short self-reported questionnaire to evaluate the AAC programme and the four modules. The participants were asked to rate the different component of the programme on a scale from 1-5 (1 been worst score and 5 been the best score). In general, participants deeply appreciated the programme and provided a 4,8 score for the overall rating of the AAC intervention (Table 4). All modules (education awareness, social inclusion, exercise and behaviour change meetings) attained a minimum score of 4,5 points having received high ratings from the participants. The exercise classes were graded with the highest rating (4,85).

Participants rating of the AAC programme

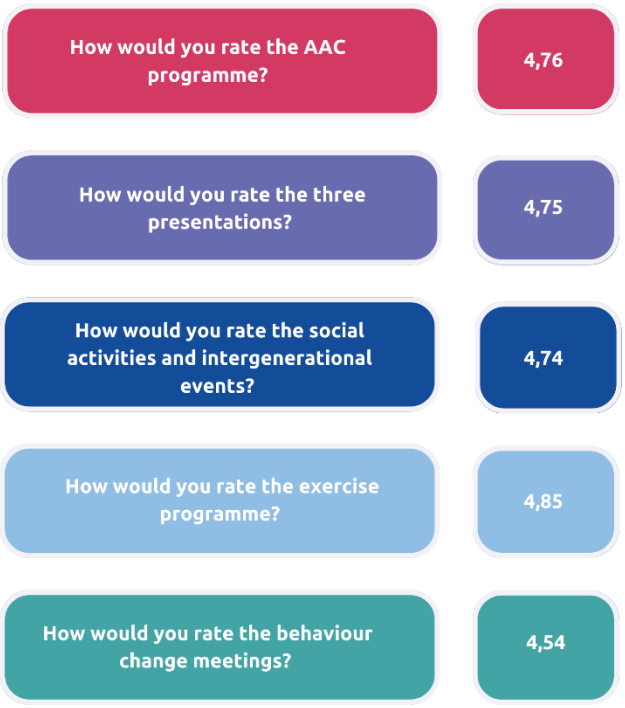

Table 4: *Participants rating of the AAC programme.*

3.3.5 PROFILES OF THE FITNESS INSTRUCTORS INVOLVED IN THE AAC PROGRAMME

In the AAC project more than 30 fitness instructors have been involved with a high experience in exercise and physical activity classes as well as working with the target population. The average age of the fitness instructors were 38 years, ranging from 25 to 64 years, with 60 percent been female. The fitness instructors possessed in average 8 years experience working with the target group and 14,5 years experience with exercise and physical activity classes. High skilled fitness professionals are a fundamental requirement for the successful delivery of the community-based programmes, as the AAC programme. This may be one of the reasons why the AAC project has succeeded with such a remarkable retention rate of 91 %.

According to the EuropeActive Employer Skills Survey 2019, 88% of physical activity sector employers believe that exercise professionals should be better supported to work with older adults, and that a lack of communication and behaviour change skills has been identified as one of the key skills gaps amongst activity professionals in the sector today. Although, the social relevance of fitness and consequently the role of coaches and instructors is a shared opinion, the sector has to take a more proactive approach to supporting and engaging with older adults.

4. Conclusion

The results of the Active Ageing project indicate that the programme was effective in relation to the retention with a remarkable 91% of the participants remaining in the programme. Key health indicators including the physical function measured by the SPPB, gait speed, chair rise, balance and body and body composition were significantly improved after the end of the intervention (Table 2). Behavioural outcomes such as daily physical activity and sedentary behaviour also improved significantly following the 6-month intervention period, with participants collecting more daily physical activity beyond the exercise program and sitting (being sedentary) less. This indicates that first two main goals of the project, i) creating a community of healthier older adults, and ii) optimise retention to the exercise programme were successfully achieved. Also, the programme had a significant effect on social behavioural components by reducing loneliness and social isolation and increasing social connectiveness. Finally, the fitness club were able to recruit a remarkable number of new members who had never participated in regular exercise programmes or had discontinued the programmes earlier.

The interviews of the participants confirmed the results from the assessment obtained before and after the intervention.

The results collected from six European countries indicated that each module in the Active Ageing Communities programme had a strong value for the participants. The participants reported that several factors related to each module promoted high retention to the programme. This included a better knowledge of through the interactive seminars which supported the adoption of new healthy habits, the support of family and peers which increased the “sense of belonging” to the community and strengthen important family relationships. Also, the participants underlined that perceiving the positive effect of the intervention was highly motivating and that the role of the trainer in creating a safe well-tailored programme and non-judgmental environment was essential. The availability of a physical space where creating an informal social networking was also considered an important aspect. Finally, the participants underlined that sharing experiences with other participants and discussing about potential solutions to bypass personal barriers helped to create healthier habits, improved the motivation and the willingness to achieve new goals such as increasing daily physical activity.

Overall, the four main objectives of the AAC projects were successfully achieved.
The results of the AAC programme are extraordinary important as they provide a clear roadmap for the necessary ingredients which should be included when designing programmes for older adults by the fitness sector. It is clear highly skilled fitness professionals are a fundamental requirement for the successful delivery of a community-based programmes, such as the AAC programme. This may be one of the reasons why the AAC project has succeeded with such a remarkable retention rate of 91%.

According to the EuropeActive Employer Skills Survey 2019, 88% of physical activity sector employers believe that exercise professionals should be better supported to work with older adults, and that a lack of communication and behaviour change skills has been identified as one of the key skills gaps amongst activity professionals in the sector today. Although, the social relevance of fitness and consequently the role of coaches and instructors is a shared opinion, the sector has to take a more proactive approach to supporting and engaging with older adults. This may also be one of the reasons why despite the overall growth in the terms of memberships, revenues and

services, the visits of people to fitness centres over 65-year-old account for only the 9% of total users.

In conclusion, the results from the AAC programme indicate that a well-tailored complex programme specifically designed for the older adults was not only highly appreciated by the participants but translated in very low drop out, increased health and adoption of new health habits and increased social sense of belonging.

This also indicates that to target the ageing population a radical re-thinking from the fitness sector shall unfold in the coming years. Traditional exercise programmes targeting healthy, fit and "ready to act" participants may not be attractive to participants who do not necessarily seek "health and fitness" as their primary goals.

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